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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

EXPERT REPORT OF PATRICK B. DOODY

December 20, 2019

Securities and Exchange Commission v. Telegram Group, Inc. and TON Issuer, Inc.

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1. Introduction

1.1 Assignment

1. I have been engaged by the Securities and Exchange Commission ("SEC") to provide expert testimony in the matter of *Securities and Exchange Commission v. Telegram Group Inc. and Ton Issuer Inc.*, pending in the United States District Court for the Southern District of New York. The SEC has retained me to independently analyze and opine on the perspective of a reasonable purchaser of the digital tokens called Grams that were offered for sale by Telegram in two rounds, the first round ending in or about February 2018 ("Round One") and the second round ending in or about March 2018 ("Round Two"), as well as the perspective of a reasonable purchaser of Grams at the time of network launch.

1.2 Qualifications

2. I am a blockchain data scientist at Integra FEC LLC ("Integra"), a forensic data analytics and economic consulting firm. My work with Integra has included assisting various government agencies to investigate financial fraud in the blockchain and digital assets space. I am also the founder and managing director of an investment partnership, Lily Pad Capital LLC. Lily Pad Capital was founded in 2016 to make investments in the digital asset space, and as Managing Director I profitably allocated capital to many digital asset investments. In addition to analyzing hundreds of companies, projects and tokens in the digital asset space, I developed and executed a successful cryptocurrency arbitrage strategy. This arbitrage operation has given me an intimate familiarity with many different participants in the digital assets ecosystem, including retail traders, institutional investors, cryptocurrency miners, software developers, entrepreneurs, and venture capital investors. In addition to my experience in digital asset investments, I have 17 years of experience evaluating and investing in companies, public equities, commodities, bonds, currencies, and derivatives of those asset classes. I received a B.S. in Electrical Engineering from Rice University, and a M.S. in Electrical Engineering from The University of Texas at Austin.

3. Appendix A to this report contains my curriculum vitae with more details about my professional background. I am a salaried employee of Integra. Integra will be compensated by the SEC at a rate of $420 per hour for the time I spent on this matter. I have been assisted by additional staff members of Integra to analyze data and documents related to this matter. Integra will be compensated by the SEC at a rate of $500 per hour (Engagement Director) and $220 per hour (Data Analyst) for their work.[1]

1.3 Documents Relied Upon

4. Appendix B to this report contains a complete list of documents and data sources I relied upon in completing the analysis in this report. These include offering documents issued by Telegram to potential investors, the Telegram Open Network whitepapers, and public trading data for a variety of digital assets.

2. Summary of Findings

5. Through my professional experience closely analyzing and investing in the digital assets space, after carefully reviewing the Telegram Open Network ("TON") whitepapers and other documents provided by Telegram to potential purchasers of Grams, I conclude that it was reasonable for a purchaser to buy Grams in Round One and Round Two with the expectation of profit derived from the work of Telegram in developing the TON Blockchain ecosystem. Specifically, the purchasers would have a reasonable expectation of profit through the resale of their Grams in the secondary market after Telegram developed and launched the TON Blockchain ecosystem using the money raised from the Round One and Round Two purchasers (the "Initial Purchasers"). I also conclude that it was unlikely that a reasonable purchaser of Grams in Round One and Round Two would acquire Grams in order to purchase goods and services, because, among other reasons, there were no identifiable uses for Grams at that time. It would

[1] Integra is currently contracted to assist the SEC in connection with one additional expert report being prepared for this case, and in four other matters, and provides services to other federal and state-level enforcement and regulatory agencies.

not make sense from a business perspective to tie up substantial capital for approximately one year or more just to purchase a potential currency that might not be widely accepted in the future. In addition, there was significant uncertainty about the future price of Grams and therefore uncertainty about how many Grams a consumer or business needed to purchase to facilitate transactions with their commercial counterparties. Furthermore, a number of the financial mechanisms and ideas Telegram marketed to potential purchasers appear to be specifically designed to increase the potential for a profitable investment return on their purchase of Grams and to reduce risk of loss for the Initial Purchasers, rather than to promote Grams as a realistic currency option to buy goods and services.

6. One important component of the Gram offering that would appeal to the mindset of a purchaser buying Grams for profit is the novel and deterministic Reference Price formula that results in an exponential increase in the price of Grams as they are issued. By prohibiting the TON Foundation from selling new Grams below this increasing Reference Price, Telegram assured potential purchasers that it would not flood the market with a new supply of Grams at prices below what the Initial Purchasers paid for the Grams, irrespective of the company's present financial conditions or need to raise more capital. Moreover, Telegram told potential purchasers that they would sell them Grams at substantial discounts to the expected Reference Price at the launch of the TON Blockchain. Telegram took this price support a step further by telling potential purchasers through its offering documents and the TON Whitepapers that it would establish a procedure for the TON Foundation to repurchase Grams directly if the market price dropped below half the Reference Price. While Telegram stated that it reserved the right but not the obligation to buy back Grams, this was nevertheless a strong, and in my experience a highly unusual, signal to potential purchasers that Telegram would protect their investment from losses. Indeed, Telegram explicitly stated: "This may help prevent sudden falls of the Gram exchange rate."[2]

7. The product plans, total addressable market, and team details described in Telegram's Whitepaper and promotional materials appeal to investors who seek a business model that provides a high

[2] Telegram Open Network Whitepaper, TG-001-00000080—211, p. 131.

potential profit upside. The Telegram and TON product roadmaps tout the large built-in potential market for Grams represented by over 200 million users of Telegram Messenger and highlighted plans to expand that market to over 675 million Telegram Messenger users by 2021, thereby expanding the potential demand for Grams. Telegram's stated ambition to disrupt the payments space and become an alternative to Visa and Mastercard create a stratospheric upper bound on the total potential market for Grams targeted by this project. And Telegram's emphasis on its leadership team's history of building valuable companies increased the likelihood that potential investors would consider a purchase of Grams to be an investment that would yield high profits when they resold the Grams to the public to satisfy the anticipated heavy demand for Grams that Telegram was working to develop.

8. In contrast, in my opinion, a reasonable person or entity considering the purchase of Grams to purchase goods and services would look to a number of different factors that received little or no attention in Telegram's promotional material, including fraud prevention, theft, integration with their existing banking relationships, and compliance with financial regulations. Providing price support would be an important feature of the project for such potential commercial users. However, instead of promoting an exponentially increasing price support, it would have been far more assuring to potential consumptive users of Grams to peg the price of Grams to a stable fiat currency underpinning a major economy such as the U.S. Dollar or Euro. As described in this report, several aspects of the Gram design choices, promotion of the Gram offering, and policies governing further sales and buybacks either do not address or would heighten rather than answer the concerns of a potential non-investment purchaser.

9. Finally, I conclude that reasonable purchasers of Grams at launch of the TON Blockchain ("Launch Purchasers") are also likely to still be purchasing Grams as an investment with the intent to profit from the efforts of Telegram, rather than purchasing Grams to buy goods and services. There appear to be only minimal commercial uses for Grams anticipated at launch. For example, no major vendor to my knowledge has agreed to accept Grams as a form of payment. The current state of the TON Blockchain ecosystem still appears to be in its infancy compared to its possibilities as marketed by Telegram. Thus, a reasonable Launch Purchaser would likely purchase Grams with the expectation of

investment profits based on the TON Blockchain's future evolution rather than to use the Grams now for the limited goods and services they may buy.

3. Background

3.1 Digital Assets

10. Digital assets, such as Bitcoin and Ether, are recorded systems of value and exchange that are maintained on decentralized and publicly accessible ledgers. Cryptographically-signed transactions denominated in these digital assets are validated and grouped together into "blocks." A "blockchain" comprises a chronological collection of successive blocks that have been accepted by a software-defined consensus mechanism. This blockchain data is stored for the collective use of anybody who wishes to interact with that data or transaction history for a given digital asset. The primary digital asset, or "token," that is recorded on a given blockchain is referred to as that blockchain's "native token." For example, the native token of the Ethereum blockchain is Ether. Grams are the native tokens for the TON Blockchain.

11. Some blockchains provide computational features beyond just the record-keeping function of maintaining a currency ledger. Such blockchains include "smart contracts," which are software-defined applications with code stored directly on the blockchain. Smart contracts contain instructions for a wide range of tasks, including automating transactions between parties, storing data on the blockchain, and defining new digital assets hosted on an existing blockchain.

12. New transactions recorded on a blockchain ledger may be validated using a proof-of-work mechanism ("POW"), in which significant computational effort must be expended in order to create a new block. New blocks may also be created by stakeholders who can prove that they hold a specified significant stockpile of the digital asset, in what is called a proof-of-stake mechanism ("POS"). The validators who participate in the TON Blockchain POS system are to be rewarded for their work by payments in Grams.

3.2 Trading Platforms

13. Digital assets, like traditional financial assets, are often traded in public marketplaces, or "trading platforms." Some popular examples of digital asset trading platforms are Coinbase, Binance, and Kraken. On these platforms, digital assets may be traded for fiat currencies or other digital assets. "Centralized exchanges" carry out this task on a private server, without recording trades directly on the blockchain. "Decentralized exchanges" do record all trades on the blockchains of the digital assets involved in a trade, making every trade publicly viewable. Both types of trading platforms, along with alternate trading venues such as futures and derivatives markets, are important components of the overall ecosystem of digital assets. These platforms facilitate the fundraising, hedging, speculating, and price discovery activities that are necessary to the proper functioning of a financial system.

3.3 Fundraising

14. A new digital asset is typically offered to outside investors and sold in an initial coin offering ("ICO"), similar in concept to a stock sale made in an initial public offering ("IPO"). An ICO may offer the new digital asset in exchange for fiat currencies or other digital assets. Sometimes they are offered to anybody who sends acceptable digital tokens to a particular blockchain address, and sometimes the sale is restricted to a set of investors who have been vetted and approved by the issuing organization.

4. Telegram Open Network Description

15. The TON Blockchain is to be built by Telegram. Telegram told potential investors that substantial functions in furtherance of the success of the TON Blockchain would be carried out by the TON Foundation through the TON Reserve (collectively referred to herein as the "TON Reserve"), including potentially buying and selling Grams in accordance with the Reference Price formula. The TON Blockchain has several distinguishing design characteristics and product features which are described in the TON whitepaper.

4.1 Grams

16. The Gram is intended to be the native token of the TON Blockchain. The TON whitepaper states that Grams are intended to be used to pay for blockchain fees, products and services provided on the TON Blockchain, and for payments between users of the TON Blockchain.

4.2 Proof-of-Stake Validators

17. The TON Blockchain uses a proof-of-stake system to validate transactions. Gram holders may volunteer to be selected to provide validation services to the blockchain in exchange for additional Grams. Providing these services is not a passive activity but rather amounts to running a business, requiring significant technical expertise along with computational resources such as processing power, network bandwidth, hard disk space.[3] Acting as a validator also requires locking up the Grams one has staked for at least one month every time one is chosen for that role.[4] Failing to fulfill all the obligations of a validator (e.g. by signing an invalid block) will result in the forfeiture of part or all of the validator's staked Grams.[5] The commitment of time, capital, and expertise makes this a role that is likely to be filled by dedicated businesses rather than by typical venture capital firms or wealthy individual investors or consumers.

4.3 Smart Contract Platform

18. Telegram proposes to implement a scalable smart contract platform in order to support an ecosystem of third party decentralized applications ("dapps").[6] These dapps are intended to provide digital services hosted on the TON Blockchain such as games, maps, gambling, or peer-to-peer financial services. Interacting with a smart contract typically requires a payment to cover the network's costs of

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[3] Telegram Open Network Whitepaper, TG-001-00000080—211, p. 45.
[4] Telegram Open Network Whitepaper, TG-001-00000080—211, p. 47-48.
[5] Telegram Open Network Whitepaper, TG-001-00000080—211, p. 64.
[6] Telegram Open Network Primer, TLGRM-010-00000513—535, p. 14.

processing the result or transaction. This is referred to as a "gas" payment and is denominated in the blockchain's native digital asset. In the case of TON, units of gas are intended to be paid in Grams.

4.4 Blockchain of Blockchains

19. Telegram proposes to facilitate the creation of entirely new blockchains on the TON platform.[7] This multi-blockchain functionality is intended to allow third-parties to create specialized blockchains with their own digital assets, all hosted and maintained on the master TON Blockchain.

4.5 Native TON Products

20. The TON whitepaper describes various products that are proposed to be developed by Telegram and built directly into the TON Blockchain, including: TON Storage, TON Proxy, TON Services, TON DNS, and TON Payments.[8] These products are intended to attract a large user base to the TON Blockchain and create a higher demand for Grams.[9]

4.6 Telegram Integration

21. In order to provide an initial critical mass of users to the TON Blockchain and to support the use of Grams, Telegram has proposed several ways that they will integrate the Ton Blockchain into Telegram Messenger, further increasing the demand for Grams, including TON wallets, External ID (a universal identity verification service), advertising on Telegram Messenger, and an app store for TON and Telegram applications.

5. Considerations of a Potential Gram Purchaser

22. Based on my extensive experience making investments in both the digital assets market as well as in companies, public equities and other asset classes, I believe that a reasonable purchaser of

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[7] Telegram Open Network Whitepaper, TG-001-00000080—211, p. 5.
[8] Telegram Open Network Whitepaper, TG-001-00000080—211, pp. 100-103.
[9] Telegram Open Network Primer, TLGRM-010-00000513—535, pp. 13-14.

Grams would consider the following factors when purchasing Grams: company and staff credentials, addressable market, product, market dynamics, and investor terms and investment exit.[10]

5.1 Company and Staff Credentials

23. The background and credentials of a team that launches a new token or digital asset is very important to improve the chances that the token increases in value over time. The promotional materials produced for Gram went to great lengths to highlight the impressive backgrounds of the Telegram team. These promotional materials especially focused on the Telegram founders' previous success in building "billion dollar companies used by hundreds of millions of people."[11] From my professional experience in the digital assets space, this information was likely to strongly appeal to investors looking for profitable investment opportunities.

24. In contrast, the background information outlined in the promotional materials did not describe the type of professional experience in finance or banking that would be necessary to address the concerns of vendors or customers who were considering a long-term usage of the Grams as part of their business operations.

25. Telegram itself is firmly associated with the digital asset investment space. According to a Telegram promotional document, Telegram Messenger was the most popular forum for discussing digital asset investments during the period of intense speculation and appreciation in the digital asset space in 2017.[12] Telegram had a well-known brand name associated with digital asset investing, and also owned the primary channel of discourse around digital asset investing. Due to this strong brand recognition, Telegram's association with the TON project itself was an extremely positive signal to investors looking to make a good return on their investment.

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[10] These factors, or variations thereof, are consistent with stated factors used by venture capitalists to evaluate investments. As an example refer to: Roberts, M. J., & Barley, L., *How venture capitalists evaluate potential venture opportunities*, Harvard Business School Research and Ideas, May 2005.
[11] Telegram Open Network Four Page Teaser, TLGRM-006-00000101—104, p. 4.
[12] Telegram Open Network Primer, TLGRM-010-00000513—535, p. 12.

26. In contrast, Telegram's position as a popular forum for promoting digital asset investments would not particularly matter to somebody deciding whether to buy and hold Grams as a personal or business decision to fulfill a functional need regarding cash management or payments solutions.

5.2 Addressable Market

27. A major point of focus of the TON whitepaper and promotional materials was the size of the potential total addressable market related to the TON Blockchain ecosystem, in addition to the large existing user base of Telegram Messenger users. This is a key consideration for investors generally, and especially for venture capital investors looking to tap into a very large potential investment opportunity that can scale very quickly and provide extraordinary returns. These investors would hope to sell their digital tokens to meet the anticipated high and growing demand for such digital tokens from either additional speculative investors or potential future users of the token. The TON whitepaper breaks down the size of the market opportunity for the TON Blockchain into two main categories: the potential market related to the Telegram Messenger social media platform, and the size of the market related to Grams as a potentially disruptive player in the payments industry.

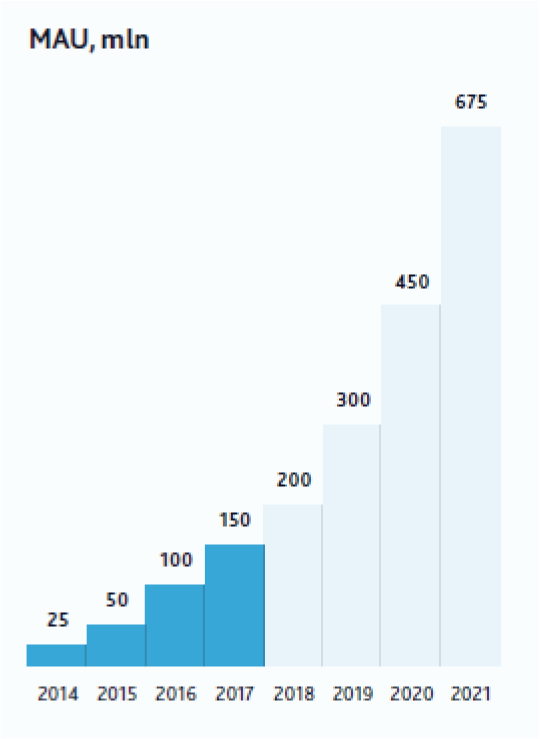
5.2.1 Telegram Messenger

28. The Telegram Messenger platform reached over 200 million monthly active users ("MAU") in early 2018. According to the TON promotional materials, and as shown in Figure 1, Telegram projects that figure to more than triple to 675 million MAU by 2021. This amounts to an impressive 50% annualized growth rate in the number of active users on the Telegram platform. Indeed, Telegram advised the Initial Purchasers that it would use proceeds from their investment to further support and develop Telegram Messenger.[13] As described in the background section of this report, Telegram informed the Initial Purchasers that it intended to directly integrate Telegram Messenger with

[13] Telegram Open Network Primer, TLGRM-010-00000513—535, p. 18.

the TON Blockchain ecosystem and the Gram token in several significant ways. This integration provides avenues for Gram holders to profit from the growth of Telegram Messenger through their investment in Grams. In my opinion, a reasonable purchaser of Grams in January through March 2018 would consider this as a reason to invest in Grams with the expectation of making a profitable investment, based on Telegram's stated intention to develop and grow Telegram Messenger and integrate it with the TON Blockchain ecosystem.

Figure 1. Realized and Projected Telegram Messenger MAU in Promotional Materials



Source: Telegram Open Network Primer

5.2.2 Gram Payments

29. Telegram's stated intention to disrupt the payments space presents a second large market for Grams. The TON whitepaper and promotional materials describe the ultimate goal of Grams achieving mass-adoption as a payment solution, competing with and potentially becoming an alternative to companies like Visa, Mastercard, and Paypal as the most common forms of payment for everyday

transactions. The global payments industry in 2018 reached $1.9 trillion,[14] which presents a massive opportunity for an entity that could successfully disrupt this space and gain significant market share. If the TON Blockchain and the Gram eventually gained widespread usage as a payments solution, the fixed initial supply of Gram tokens and low inflation rate necessarily results in a price per Gram that is orders of magnitude higher than the price paid by investors in the initial fundraising rounds. In my opinion, a reasonable purchaser of Grams would consider the large scale of this potential market and the potential for the TON Blockchain to achieve mass-market adoption as a reason to purchase Grams with the expectation of profits derived from the efforts of the Telegram team to develop the TON Blockchain.

5.3 Products

30. The product development roadmap describes several ways in which potential economic activity may take place on the TON Blockchain. These future use cases could increase the speculative market capitalization of Grams. In addition, future usage of the TON Blockchain products—contingent on their successful development and implementation by Telegram—would increase the demand for Grams as gas payments and transaction fees.

31. First, the Telegram development plan includes the intended creation of a variety of products that will be native to the TON Blockchain: TON Storage, TON Proxy, TON Services, TON DNS, and TON Payments. Second, the Telegram development plan includes a variety of products that are part of Telegram Messenger but integrate closely with the TON Blockchain: TON wallets, External ID, paid bots, groups and channels advertisements, purchasing digital content and physical goods, and an app store with a registry for TON dapps. Third, the smart contract platform built into the TON Blockchain will allow third party developers to make software hosted directly on the TON Blockchain. All three types of products require significant investment by Telegram developers. Specifically, it is worth noting that the second set of products, which require integration with Telegram Messenger, would need

[14] McKinsey and Company, *Global Payments Report 2019*, p. 3.

significant development and maintenance efforts by Telegram Messenger to ensure i) proper usage and engagement by Telegram Messenger users and ii) the subsequent usage and engagement of the TON Blockchain by those users. Such development and maintenance efforts by Telegram would need to continue after the launch of the TON Blockchain.

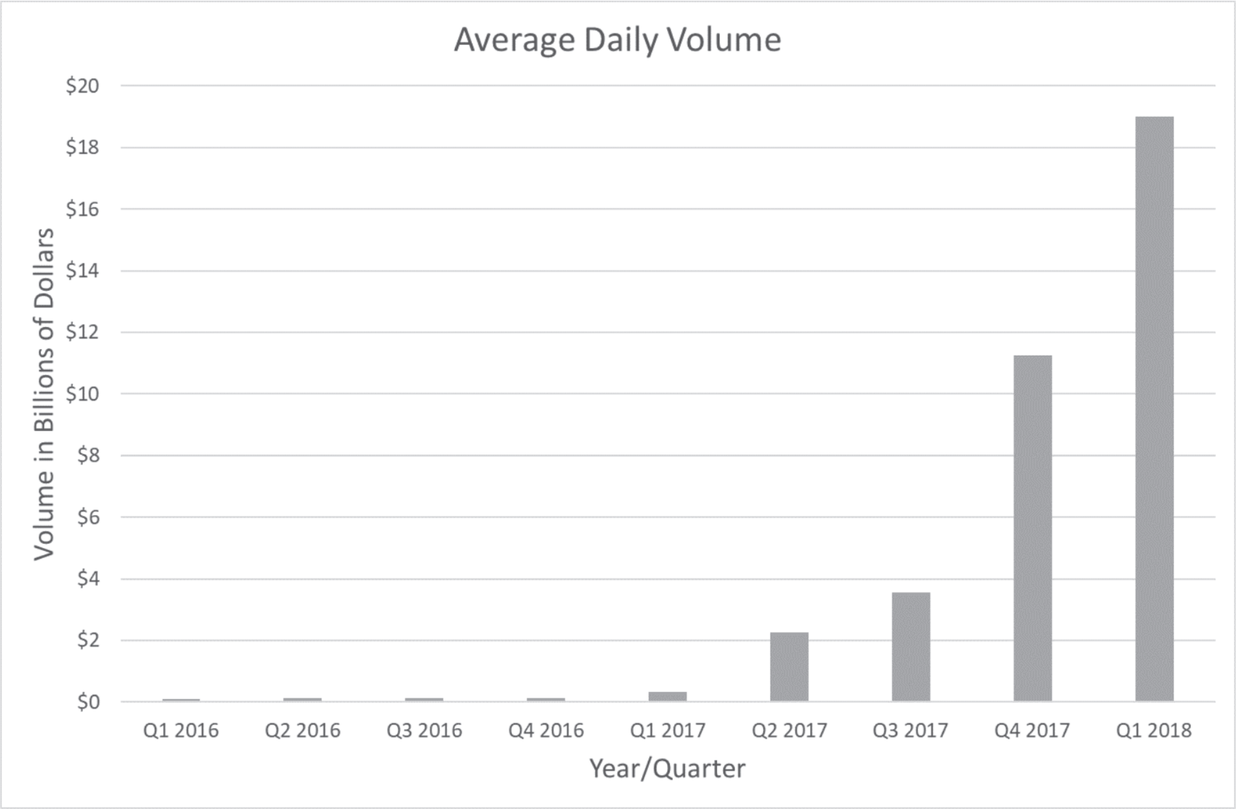
32. The story Telegram promoted by highlighting these three sources of users and activity related to the TON Blockchain would, in my experience and opinion, heighten interest in the purchase of Grams as an investment with the expectation of a profit. A reasonable investor in a digital asset would consider the different potential sources of users, transactions, and value on a new blockchain. A narrative that includes many large sources of potential usage is more likely to garner press coverage, support from digital token trading platforms exchanges, and backing by key investors and influencers in the digital assets space and therefore increase the likelihood that a purchaser would buy Grams with the expectation of profit once Telegram develops and launches the TON Blockchain.

5.4 Market Dynamics

33. The overall digital assets market was in the midst of a speculative fervor throughout 2017 and leading up to the Round 1 and Round 2 sale of Grams in the first quarter of 2018. The high trading activity and investment returns of this asset class in general helped to support the price of digital assets and led investors to treat new digital assets as potential investment opportunities.

34. The U.S. dollar denominated trading volumes for digital assets grew consistently during this time period. Figure 2 shows the growth in trading volumes for the 100 digital assets with the highest market capitalization in 2018 that also had trading data going back to 2016. The total trading volume for this collection of digital assets grew from $90 million per day in the first quarter of 2016 to $19 billion per day in the first quarter of 2018, an increase of over 200 times.

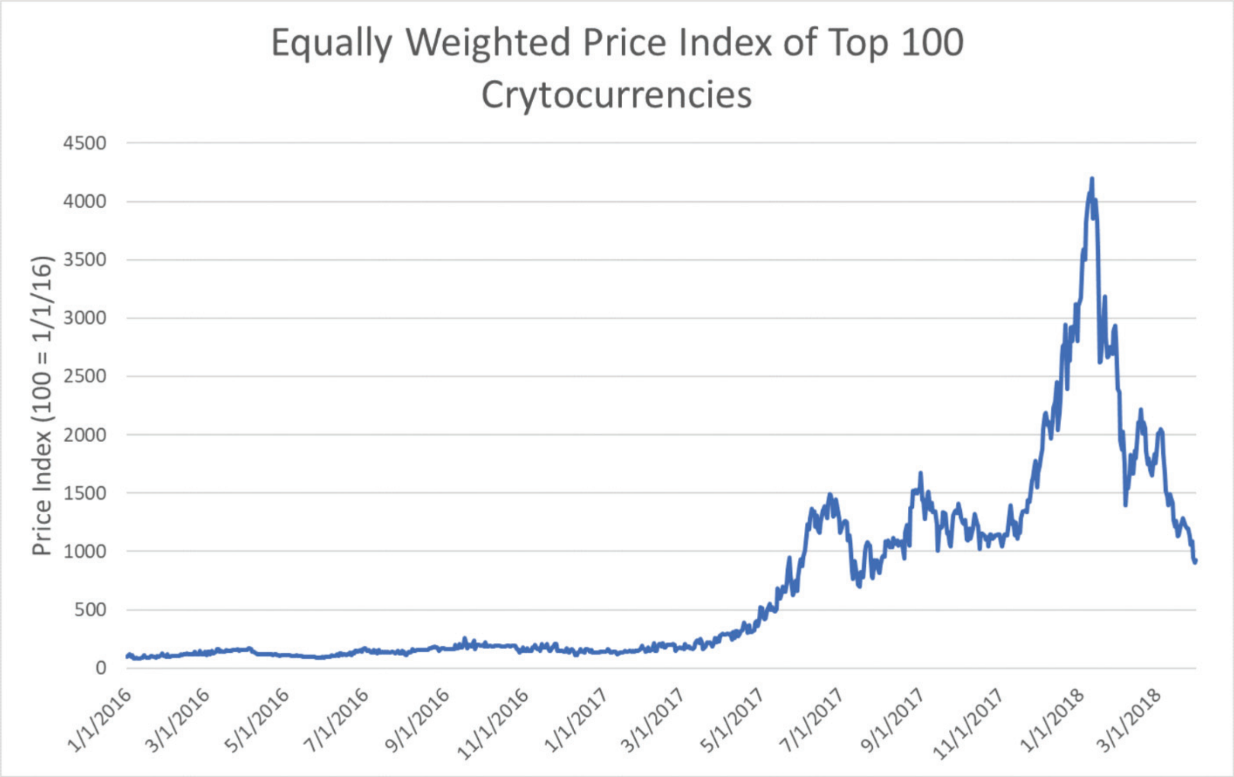
Figure 2. Average Daily Trading Volume for Top 100 Digital Assets



Average Daily Volume
$20
$18
$16
$14
$12
$10
$8
$6
$4
$2
$0
Volume in Billions of Dollars
Q1 2016
Q2 2016
Q3 2016
Q4 2016
Q1 2017
Q2 2017
Q3 2017
Q4 2017
Q1 2018
Year/Quarter

35. The price performance of digital assets during this period was strong as well. For the same group of 100 largest tokens by market capitalization that was used in the preceding paragraph, the daily equal-weighted price index was calculated starting at the beginning of Q1 2016 and ending with the close of Q1 2018. Figure 3 shows the price chart of this digital asset price index. Even with a severe downturn in this asset class at the end of the measured period, the annualized return of that basket of digital assets was 1,984%. The high investment returns of many digital assets during this time period would give a reasonable investor confidence that the rising tide of digital assets would provide some downside protection for their investments in this space.

Figure 3. Price Index Chart of Top 100 Digital Assets



Equally Weighted Price Index of Top 100 Crytocurrencies
Price Index (100 = 1/1/16)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1/1/2016
3/1/2016
5/1/2016
7/1/2016
9/1/2016
11/1/2016
1/1/2017
3/1/2017
5/1/2017
7/1/2017
9/1/2017
11/1/2017
1/1/2018
3/1/2018

36. Due to the strong correlation between digital assets and high returns across the entire digital asset space, a reasonable purchaser of Grams familiar with the digital asset space would consider this robust market for digital tokens as an added reason to purchase Grams with the intent to profit. Indeed, the correlation between the daily market returns of individual digital assets and the daily market return of Bitcoin was positive for the vast majority of digital assets in 2017.[15]

5.5 Investment Terms and Investor Exit

37. According to the Telegram offering documents and the TON whitepaper, the total potential supply of five billion Grams would be allocated to five broad categories, with different rights,

[15] Hu, A., Parlour, C. A., & Rajan, U., *Cryptocurrencies: Stylized Facts on a New Investible Instrument*.

restrictions, and uses associated with each category.[16] Approximately 2.25 billion Grams are allocated for the First Round investors. These investors are subject to a lock-up period that restricts the sale of Grams, with 25% of their Grams available for sale 3, 6, 12, and 18 months after network launch. Approximately 639 million Grams are allocated to the second round of investors. 500 million Grams are allocated to the incentives pool for customers and companies participating in the TON ecosystem. 200 million Grams are allocated to the developer pool for Telegram employees. The Grams in the developer pool are to be subject to a vesting period and therefore will not be immediately available for sale. Finally, at the time of network launch the TON Reserve is planned to have control of the remaining 1.4 billion Grams.

38. In a typical securities offering, the issuing organization has the power to dilute current security holders or suppress the price of the asset through additional sales at low prices. Telegram created a price formula that sets the minimum price at which Gram sales may occur by the TON Reserve. This price is well above the price at which the Initial Purchasers bought their Grams. The existence of the price floor substantially assuages concerns by the Initial Purchasers that their potential for profit will be negatively impacted when the Ton Reserve sells Grams. The Gram Reference Price formula guarantees that the sale price of the Grams increases exponentially as a function of the number of Grams that have been put into circulation. The reference price formula is given by:

$$p(n) = 0.1 \cdot e^{10^{-9}n}$$

where n is the number of Grams in circulation. This formula dictates that the first Gram is sold for a price of $0.10, and the final Gram under the total initial supply cap is sold for a price of $14.84, a total increase of more than 14,700% from the first Gram in circulation to the last Gram in circulation. Based on the $850 million in Grams expected to be sold to the First Round and the $1.7 billion in Grams Telegram told the Initial Purchasers it expected to raise in subsequent rounds, the anticipated Reference Price at launch would have been $2.65.[17] This price was substantially, indeed enormously, higher than what the Initial

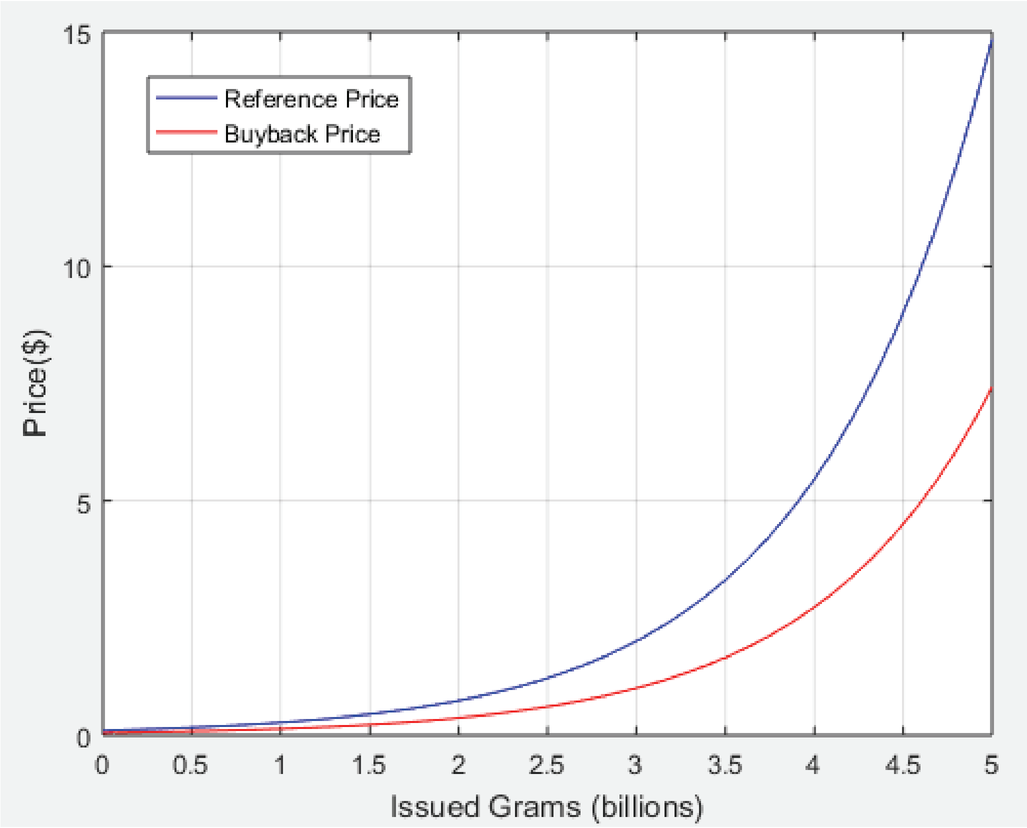
[16] Second Supplemental Memorandum to the Staff of the Securities and Exchange Commission, p. 4.

[17] This calculation excludes an additional 700 million Grams that Telegram at some point deemed issued for purposes of calculating the Reference Price. Including these additional 700 million Grams would raise the

Purchasers paid for their Grams, thereby assuring them that Telegram would not reduce their chance to profit from their investment by selling Grams into the market at prices below their purchase price or even anywhere remotely near that price.

39. In addition to a guaranteed minimum sale price received by the TON Reserve as it sells Grams, the TON Reserve also told potential purchasers that it was setting up a mechanism to engage in Gram buybacks in order to boost the price of Grams directly by increasing demand for Grams and reducing the remaining supply of Grams in circulation.[18] According to the TON whitepaper, these buybacks "may help prevent sudden falls" in the price of a Gram. The buyback price occurs at or below a value of one half of the Reference Price shown in the preceding paragraph. Figure 4 shows the minimum sale price and the buyback price of Grams as they are put into circulation.

Figure 4. Gram Price vs Grams in Circulation



hypothetical Reference Price in this calculation from $2.65 to $5.34. This topic is discussed in greater detail in Paragraph 47.

[18] Telegram Open Network Whitepaper, TG-001-00000080—211, p. 131.

40. The unique buyback mechanism described in the TON whitepaper is significant in that Telegram is sending the signal to potential purchasers that it may actively protect investors from losing all, or indeed, any of their money. Although Telegram makes clear that they are not legally obligated to complete such a buyback, the very existence of this buyback program sends a strong signal to investors that Telegram will act to reduce their risk of loss on their purchase of Grams. In my experience and opinion, a reasonable purchaser would read this section of the whitepaper and receive the clear message that Telegram intends to spend its own capital, if necessary, to lower the risk and increase the expectation of profit from the purchase of its Grams.

41. In essence, Telegram communicated to potential Gram purchasers that it will refrain from selling Grams in a manner that would adversely impact the Gram holders' profit potential and that it stands ready to provide price support by purchasing Grams if the market price significantly decreases. Furthermore, since there is an initial cap of five billion Grams that may be put into circulation, Telegram will reach a point at which it can no longer sell new Grams at all. After that point, the price of a Gram would be able to freely appreciate while Telegram would still be able to provide price support if the Grams decrease in value.

42. My opinion as an observer and participant in digital asset markets is that Telegram's unique price support mechanisms would lead a reasonable purchaser of Grams to believe that Telegram is strongly supporting profit generation by the Initial Purchasers when they resell their Grams. This provides a strong incentive for potential purchasers to buy Grams with the expectation of achieving a profit through the efforts and protections of Telegram.

43. In addition, the Reference Price formula works in such a way that it ensures that both the First and Second Round Initial Purchasers will be guaranteed a profit if the market price of Grams tanks after launch and the TON Reserve implements its buyback program at the buyback price dictated by the Reference Price formula.

44. Approximately 3.59 billion Grams are deemed to be in circulation at the TON network launch. This includes the Grams sold to the Initial Purchasers plus two pools of Grams allocated towards incentive payments for developers and other parties participating in the TON ecosystem. Given this number of circulating Grams, the Reference Price at network launch is approximately $3.62 per Gram. The corresponding buyback price therefore starts at $1.81 per Gram. The initial round of investors purchased at an average price of just under $0.38 per Gram, and the second round of investors purchased at an average price of just over $1.33 per Gram.

45. When Telegram purchases Grams according to the Reference Price formula, the number of issued Grams will shrink and the buyback price will decrease accordingly. Accounting for this decrease, the total amount of money distributed to investors during a buyback is given by:

$$M(n, \Delta\mathrm{n}) = 0.5 \cdot 10^9 \cdot p(n - \Delta\mathrm{n}) \cdot (e^{10^{-9} \cdot \Delta n} - 1)$$

where n is the number of Grams in circulation before the buyback and Δn is the number of Grams purchased by Telegram during the buyback. Using these formulas, one can calculate the amount of money that would be returned to each category of investor if Telegram executed a buyback starting at the Reference Price at network launch. Since the Round One investors have sale restrictions at the time of network launch, Round Two investors will be able to sell back their entire supply of tokens first, after which Round One investors can sell back their tokens after the sale restrictions are lifted. Table 1 shows the original investments, average buyback price, and amount received from buybacks for each of the initial rounds of investors under the scenario where the entire round of investors sell their Grams back to Telegram in a buyback.

Table 1. Initial Investment and Buyback Amounts For Each Investment Round

Investor Group	Round One Investors	Round Two Investors
Grams Owned	2.25 Billion Grams	639 Million Grams
Average Purchase Price	$0.378	$1.330
Average Buyback Price	$0.380	$1.339
Investment Amount	$850 Million	$850 Million
Buyback Amount	$856 Million	$856 Million

46. These results demonstrate that the buyback policy will return all of the purchasers' initial investments in the case of a falling Gram price right after network launch, plus a small profit. If the price of Grams stays high after the network launch and more Grams are sold from the TON Reserve, then the reference price and buyback price will increase further to provide an even greater margin of safety for the Initial Purchasers.

47. There is one additional feature of the Reference Price formula that is significant for this analysis. At the time of network launch, none of the 700 million Grams allocated collectively to the incentive pool and developer pool will have vested and/or otherwise be available for use or resale on exchanges. Despite this, Telegram considers all 700 million of those Grams as already issued for the purpose of calculating the Reference Price. This policy decision is significant in that it increases the Reference Price at launch from $1.80 to $3.62 and therefore also increases the buyback price at the network launch (half the Reference Price) from $0.90 to $1.81, thereby doubling the buyback price. This 100% increase in the Reference Price is arbitrary, improves the risk profile of the Round 1 and Round 2 investments substantially, and gives an even greater assurance that investors will get their original investments back in the worst case.

48. Furthermore, the Reference Price formula is inherently flawed if it is intended to be a mechanism to promote price stability in order to encourage purchases of Grams for use as currency or to buy goods and services, as opposed to as an investment opportunity. Mass-adoption of a token as a

medium of exchange and an alternative to cash and credit cards requires a token that maintains a steady value over time. For this reason, many other digital assets that are attempting to gain widespread adoption as a payment solution have put mechanisms in place to peg their value to a fiat currency such as the U.S. Dollar. So-called "stablecoins," such as Tether, DAI, and USDC also attempt to influence the price of their tokens over time, but stablecoins use a very narrow band of allowable prices rather than encouraging a 100-fold or greater price appreciation like Grams. An asset that can rapidly and/or substantially increase in value encourages investment, speculation, and hoarding. Such potential for rapid and/or substantial price appreciation, with the attendant risks of rapid and/or substantial price decreases, does not encourage consumers to purchase such a digital token to buy everyday goods and services. Neither does it encourage businesses to agree to accept such tokens as payment, given the high risk of rapid and wide price changes from day to day. Businesses prefer not to constantly recalculate and change the posted price for their goods or services when a currency's value changes dramatically.

6. Conclusion

49. My professional experience as an investor and analyst of the digital asset space leads me to conclude that a reasonable purchaser of Grams during Rounds One and Two would consider that purchase to be an investment with the expectation of earning profits. Those investment profits would reasonably be expected to be realized by selling the Grams to other public investors later at a higher price, with the profitability of this activity dependent on the future work of Telegram to build a successful TON Blockchain ecosystem and a Gram that was in high demand on or after the launch of the TON Blockchain.

50. A standard framework of investment analysis provides the basis for this conclusion. Team, product strategy, total addressable market, market dynamics, and investor exit including deal terms are the primary factors considered to determine the viability of an early stage investment. Those factors were all thoroughly addressed by the TON whitepaper and other promotional materials in order to convince a potential purchaser that Grams would make a good investment. The team credentials

highlighted the Telegram leadership's previous success in building valuable companies. The product strategy was described as a plan to develop appealing technology and attract hundreds of millions of users onto the platform. A massive potential total addressable market, including the trillion-dollar commercial global payments space, makes for an investment opportunity that is sufficiently large to provide high upside for early investors. The deal terms and investor exit support offered by Telegram to the Initial Purchasers include a purchase price for Grams that is a steep discount to the anticipated Reference Price at launch. The Reference Price policy strongly supports the profitability of an investment in Grams through company sale restrictions and direct buybacks if necessary.

51. In contrast, significant aspects of Telegram's anticipated TON Blockchain would not motivate a reasonable person looking to purchase a digital token to buy or sell goods and services to buy Grams during Rounds One and Two for that purpose. The exponential rise in the reference price as Grams are issued is actually counterproductive to that goal, as consumers and businesses do not prefer to transact with strongly appreciating assets to buy everyday goods and services. A pegged digital asset would have been much more attractive for that use-case. Furthermore, it would not make sense for a business or customer to tie up substantial capital ($1 million minimum for natural persons and $10 million for entities) and endure price swings for a year or more just to buy a currency that can be purchased as it is needed in the future. Basically, a reasonable purchaser at the time of the Gram offering would decide to buy Grams based on the investment potential for profit and not for the potential future consumptive use possibilities for Grams.

52. Furthermore, my professional experience leads me to believe that a reasonable purchaser of Grams at the time of the network launch is likely to make that purchase as an investment with the expectation of profit based on the further development of the TON Blockchain ecosystem. Most of the investment factors discussed in this report apply equally to the Initial Purchasers and to the Launch Purchasers. To the extent that some applications and software features of the TON Blockchain may be functional at the time of launch, some of the Launch Purchasers may buy Grams to use those features. However, based on my review of Telegram's list of applications and services expected to be available at

launch, as described in Response to the SEC's Interrogatory Number 5, such applications are minimal and the TON Blockchain's offerings are still in their infancy compared to the potential future ecosystem Telegram has promoted in its offering materials. For example, I am not aware that any major vendor has agreed to accept Grams as a form of payment. This limits the number of persons and entities likely to be interested in purchasing Grams at launch for consumptive use, as opposed to purchasing Grams with the expectation of earning an investment profit as Grams increase in value when the TON Blockchain matures and more applications and uses become available.

53. The opinions expressed in this report are based on my review and analysis of the documents that I have reviewed. I reserve the right to supplement my report and analysis based on any new evidence brought to my attention.

Patrick B. Doody

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KEY QUALIFICATIONS AND EXPERIENCES

- 17 years of experience investing in equities, commodities, bonds, and foreign exchange, including futures and derivatives trading
- 3 years of experience investing in digital assets on spot and futures markets
- 10 years of experience developing algorithmic trading strategies across multiple asset classes, first in traditional financial markets and later in digital assets
- Deep knowledge of digital assets markets, including ICO market and arbitrage strategies
- Led data-driven investigations in digital assets fraud cases involving money laundering, market manipulation, and misappropriation of funds
- Founded two technology companies; experience pitching and raising funds from venture capital investors

EDUCATION

University of Texas at Austin, Austin, TX
M.S., Electrical Engineering, May 2010

Rice University, Houston, TX
B.S., Electrical Engineering, May 2006
Honors: magna cum laude

PROFESSIONAL EXPERIENCE

Lily Pad Capital, LLC, Austin, TX 2016 – *Present*
Founder and CEO

- Founded a quantitative investment partnership originally focused on investments in the digital assets space, and later on long-term equity investments as well as derivatives strategies in equity, commodities, and currency markets
- Developed, executed and optimized cryptocurrency arbitrage strategies, focusing on arbitrage opportunities between spot and futures markets
- Analyzed and valued investment opportunities in digital assets markets
- Led the design software and processes to automate execution of multiple investment strategies, identify arbitrage opportunities, manage counterparty risk, and securely store digital assets
- Developed derivatives trading strategies utilizing machine learning and statistical signal processing techniques

Integra FEC, Austin, TX *2019 – Present*
Blockchain Data Scientist

- Led data-driven investigations in digital assets fraud cases involving money laundering, market manipulation, and misappropriation of funds
- Built statistical tools to analyze trading data and algorithmically identify manipulative trading activity
- Developed custom software and data analysis solutions to trace, cluster, and deanonymize cryptocurrency transactions
- Analyzed activity patterns in smart contracts, ERC-20 tokens, and fund transfers on the Ethereum blockchain to identify fraudulent financial activity

Goco Sensors, Inc, Burlington, MA *2015 – 2016*
Founder and CEO

- Founded a technology company that developed automotive radar for autonomous vehicles
- Designed radar hardware and signal processing algorithms to enable automated detection of objects in a vehicle's environment
- Managed the company's engineering, fundraising, and recruiting efforts

MITRE Corporation, Bedford, MA *2013 – 2015*
Senior Engineer

- Designed, modeled, tested, and defined requirements for multiple large radar projects

MIT Lincoln Laboratory, Lexington, MA *2010 – 2012*
Associate Technical Staff

- Developed signal processing algorithms for airborne radar systems

Ercot, Taylor, TX *2007 – 2009*
Research Assistant

- Implemented market rules for electricity spot and derivatives trading and tested software for ERCOT's real-time and day-ahead nodal market clearing engine

Documents I relied upon to complete my analysis

SEC vs. Telegram Group Inc. Protective Order

Telegram Group Inc. Purchase Agreement for Grams (TG-001-00000014—53)

Telegram Group Inc. Purchase Agreement for Grams, Stage A of the Subsequent Sale (TG-003-00000223—251)

Telegram Group Inc. Indication of Interest, Stage A of the Subsequent Sale

Telegram Group Inc. Indication of Interest, Round 1 (BC000323)

Telegram Open Network – Four Page Teaser (SC-00000002—5)

Telegram Open Network Whitepaper (TG-001-00000080—211)

Telegram Open Network Whitepaper (RIB_TG_00014740-14871)

Telegram Open Network Pre-sale Primer (RIB_TG_00014872—97)

Telegram Open Network Stage A Primer (TLGRM-008-00005149)

Email to Potential Second Round Investors from John Hyman (TG-005-00011292)

Telegram Open Network Primer

Process Memorandum for Entering into a Purchase Agreement for Grams (RIB_TG_00014907—53)

Email Regarding Private Placement Update from John Hyman (RIB_TG_00014739)

Risk Disclosure Regarding Purchase, Sale, and Use of Grams (RIB_TG_00014898—906)

Supplemental Notices to Residents of Certain Areas (TG-003-00000223—51)

Second Supplemental Memorandum to the Staff of the Securities and Exchange Commission

Defendants' Responses and Objections to Plaintiff's First Set of Interrogatories

Outside reference materials cited in the report

Roberts, M. J., & Barley, L., How venture capitalists evaluate potential venture opportunities, Harvard Business School Research and Ideas, May 2005.

Hu, A., Parlour, C. A., & Rajan, U., Cryptocurrencies: Stylized Facts on a New Investible Instrument.

McKinsey and Company, Global Payments Report 2019.

Data sources

Digital asset volume and price data from coinmarketcap.com